

Name: _____

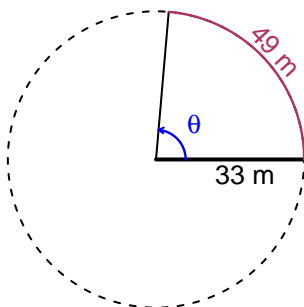
Date: _____

Trig Final (SLTN v660)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 33 meters. The arc length is 49 meters. What is the angle measure in radians?

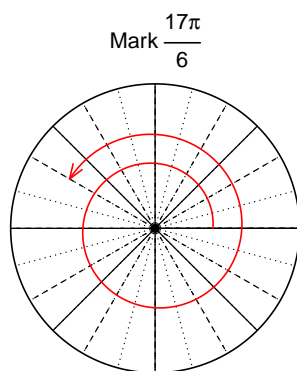


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 1.485$ radians.

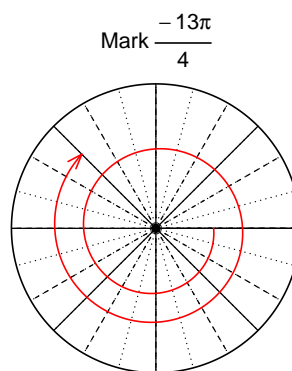
Question 2

Consider angles $\frac{17\pi}{6}$ and $-\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{17\pi}{6}\right)$ and $\sin\left(-\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(17\pi/6)$

$$\cos(17\pi/6) = \frac{-\sqrt{3}}{2}$$



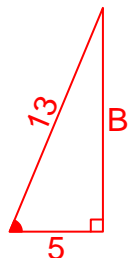
Find $\sin(-13\pi/4)$

$$\sin(-13\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\cos(\theta) = \frac{-5}{13}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



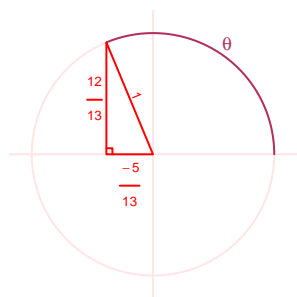
Solve the Pythagorean Equation

$$5^2 + B^2 = 13^2$$

$$B = \sqrt{13^2 - 5^2}$$

$$B = 12$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{12}{13}}{\frac{-5}{13}} = \frac{-12}{5}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.53 meters, a midline at $y = 2.29$ meters, and a frequency of 6.08 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.53 \cos(2\pi 6.08t) + 2.29$$

or

$$y = 7.53 \cos(12.16\pi t) + 2.29$$

or

$$y = 7.53 \cos(38.2t) + 2.29$$